

LECTURE 4 TWENTIETH CENTURY STUDIES OF ADULT LANGUAGE USAGE: EXPERIMENTAL, FUNCTIONAL AND STATISTICAL.

ROOTS	<i>Linguistic</i>	<i>Adult processing</i>	<i>Developmental</i>	<i>Brain</i>
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1780-1900



Wilhelm Wundt's unification, *Die Sprache* 1900

1900-World War II



Psycholinguistics during the Third Reich / Re-establishment of the discipline

LEONARD BLOOMFIELD ON LINGUISTICS AND PSYCHOLOGY

Bloomfield (1914): *To demonstrate in detail the role of language in our mental processes would be to outline the facts of psychology.*

Bloomfield (1933): *We can pursue the study of language without reference to any one psychological doctrine.*

MAIN TWENTIETH CENTURY HIGHLIGHTS

EUROPE

The Würzburg School

Thumb/Marbe, word association

The Bühler-Wundt clash

Selz, sentence formulation

Bühler, organon theory

AMERICA

Behaviorism, behaviorism

Huey, Preston, Stroop et al., reading

Gutzmann, Wells, Peterson & Barney, perception of speech sounds

Harvey Fletcher, intelligibility of speech

Skinner, response bias, association

Meaning, associations, scaling, content analysis, phonetic symbolism,
metaphor, semantic conditioning, mediation theory

Zipf, statistical approach

Individual differences verbal abilities, personality, etc.

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THE WÜRZBURG SCHOOL

Main proponents: Oswald Külpe (1862-1915), Karl Marbe, Narziß Ach, Karl Bühler, Otto Selz

Würzburg theory: there is more to consciousness than images, memories and feelings. There is in addition “imageless thought”, Imageless consciousness of tasks, aims, thoughts.

Würzburg methodology: “systematic experimental introspection”.

In France, Alfred Binet, more or less independently, developed the same ideas.

THE BÜHLER-WUNDT CLASH



Karl Bühler

Example of Bühler's Ausfragemethode (1907)

Yes/no question:

To search for skunks one shouldn't look among criminals, but among those who never do wrong.

Response of subject K (Külpe himself, response latency 14 seconds):

Yes, first 'searching': how can you say a thing like that? Then... (some memories of Lombroso). Then suddenly with inner zest the phenomenologically not represented thought: Those who commit nothing, are just as shrewd not to get into conflict with the law. Therefore they are skunks.



Wilhelm Wundt (1908): *Scheinexperimente!*

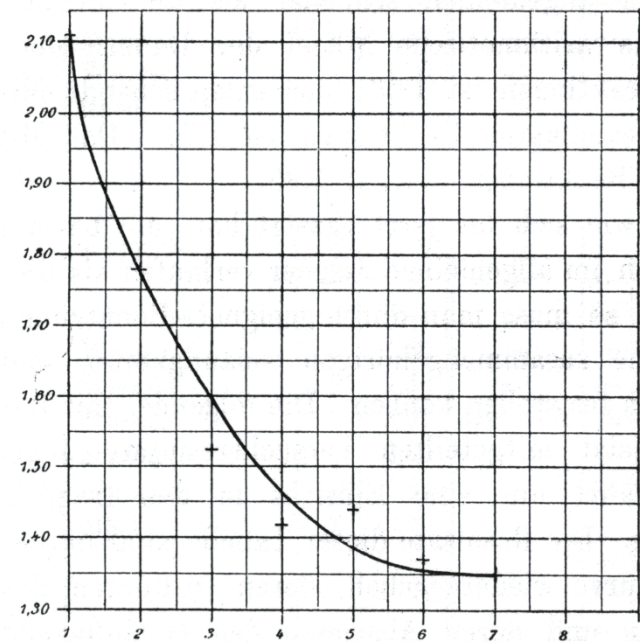
ALBERT THUMB (1865-1915) AND KARL MARBE (1869-1935) ON WORD ASSOCIATION.

*Experimentelle Untersuchungen über die psychologische Grundlagen
der sprachliche Analogiebildung (1901)*

Findings:

1. Word associations tend to retain word class. (*table-chair, walk-run, good-bad, etc.*)
2. “Marbe’s law”. The more subjects agree, the shorter the response latency.

response latency in seconds



number of subjects (out of 8) agreeing
on response

OTTO SELZ (1881-1945)

The first procedural, “computational” theory
of thinking and of sentence formulation



Über die Gesetze des geordneten Denkverlaufs (1913)

Zur Psychologie des produktiven Denkens und des Irrtums (1922)

SELZ'S OPERATIONAL THEORY

An operation is an IF-THEN relation: IF desired effect/goal is E , then apply means M .

Our memory contains operations $G \rightarrow M \rightarrow E$ that in the past have been successful.

If my new goal/task G at hand is to achieve E , then I must retrieve the appropriate means from memory. This is done by setting up the retrieval schema $G \rightarrow ? \rightarrow E$, where $?$ stands for the sought means. The part $? \rightarrow E$ is the adequate stimulus for retrieving $M \rightarrow E$ from memory. This is called *schematic anticipation*: it provides me with the means M to be applied.

In productive, creative thinking, there is often no relevant $M \rightarrow E$ in memory. New means have to be created. Selz formulated a range of workable procedures to achieve this.

OPERATIONS OF SENTENCE FORMULATION

Experimental procedure. Possible two-word stimuli:

Part
Clarinet

Superordinate
Car

Definition
Tool

Example: stimulus

Definition
Tool

incremental response

*A tool is... an instrument...
which ...can serve for the construction of objects*

IF goal is *define X*, THEN retrieve def.schema: *X is a (kind term), (relative schema)*

Phase I formulation: *A tool is an instrument.* Phase II formulation: *which can serve...*

THREE KINDS OF SENTENCE CONSTRUCTION

A. The content is fully there at the outset. Formulating is “subsequent.” It is also “analytic,” because it is the partitioning of the content which takes the lead. This sounds familiar, because it is essentially Wundt’s formulating procedure. It is, however, exceptional.

B. The content is still to be found. Two cases should be distinguished:

(a) Phase-wise formulating. The development of thought and of linguistic formulation runs in parallel. This is the common, dominant case as in giving definitions.

(b) Synthetic formulation, which is a particular type of “subsequent” formulation. Here the development of content is “synthetic,” i.e., not by analysis of a pre-given thought or “total image,” but rather by adding related thought fragments, one after another. The final “collection” of pieces activates a sentence or phrase schema that can handle them. This is somewhat like Paul’s formulating theory.

KARL AND CHARLOTTE BÜHLER

University of Vienna,
1922-1938



Karl Bühler (1879-1963)

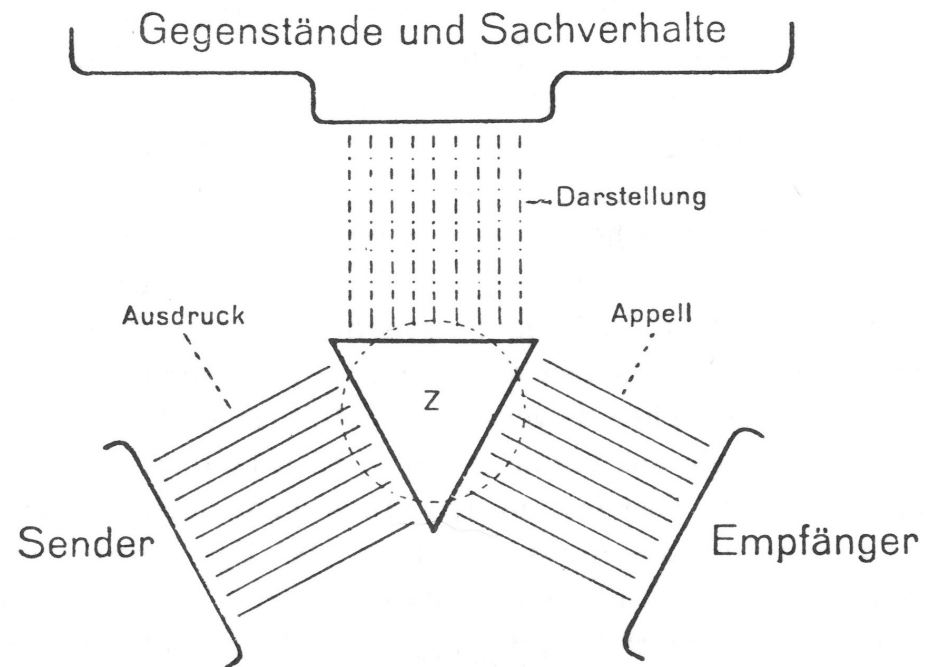
Charlotte Bühler-Malachowski (1893-1974)

Among their students and co-workers: Hildegard Hetzer,
Paul Lazarsfeld, Egon Brunswick, Karl Popper,
Konrad Lorenz, Frieda Goldman-Eisler.

KARL BÜHLER'S DARSTELLUNGSTHEORIE

Sprachtheorie. Die Darstellungsfunktion der Sprache (1934)

The Organon Model:



THE TWO-FIELD THEORY OF REFERENCE/REPRESENTATION

1. The deictic field

1. *Demonstratio ad oculos*. The perceptual situation as field.
The speaker's *I/here/now* origin of the deictic field and the issues of speaker/listener alignment (*I/you, here/there*, etc).
2. *Anaphora*. The discourse as field (*pronouns, relatives, etc.*
New: cataphora).
3. *Deixis am phantasma*. Imagined context as field.

THE TWO-FIELD THEORY OF REFERENCE/REPRESENTATION

2. The symbol field

A two-class system consisting of lexicon and syntax.

Syntax allows one to represent by means of a limited set of conventions and corresponding syntactic constructions . . . an unlimited variety [of things] . . . The human languages that we know today can all claim to be such 'productive,' even universal symbol systems . (p. 76).

We can also symbolize numbers ad infinitum with just ten elementary signs and a simple, conventionally agreed syntax. (p. 77).

Only field systems of the type 'language' can, under the limitations of material and memory capacity, . . . provide the needed productivity and adaptability. (p. 78).

BÜHLER'S TREATMENT OF ELLIPSES

Customer in a coffee shop ordering *a black one*.

The client is simply being efficient. The reference could not have been more obvious; *therewith, it seems to me, everything psychological has been said*.

Bühler in particular rejects the idea, suggested in linguistic circles, that the speaker silently construes a sentence, only uttering part of it.

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The German customer ordered: *einen schwarzen*.

How come, masculine-accusative?

THE AMERICAN SCENE

1. Strong inclination to differential psychology
2. Behaviorism, since World War II

“Objectivism”, eradication of all mentalistic notions

In a system of psychology completely worked out, given the responses the stimuli can be predicted; given the stimuli the responses can be predicted. Watson (1914)

“Behaviorese”

It was the changes in the lexicon of psychology to match the new meanings which gave the appearance of novelty to behaviorism... It became a “Great War of Words” Esper (1968)

SOME HIGHLIGHTS OF AMERICAN READING RESEARCH

Edmund Huey (1908)

The psychology and pedagogy of reading

It is of the greatest service to the reader or listener that at each moment a considerable amount of what is being read should hang suspended in the primary memory of the inner speech.



Edmund Huey 1870-1913

SOME HIGHLIGHTS OF AMERICAN READING RESEARCH

Charles Hubbard Judd (1873–1946), with co-workers (U.Chicago)

Eye tracking studies of eye-voice span, as measure of reading ability

Using speech in reading is detrimental.

Miles Tinker (1893-1977), with coworkers (U. Minnesota)

Measurement of pause and movement durations as a function of text difficulty and reading ability

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HIGHLIGHT: Katherine Preston (1935) discovered the word frequency effect in naming latencies for high- and low-frequency printed six-letter words. $RT_{HF} = 578$ ms; $RT_{LF} = 691$ ms

SOME HIGHLIGHTS OF AMERICAN READING RESEARCH

John Ridley Stroop (1897-1973).

Studies of interference in serial verbal reactions.
J. Exp. Psych. (1935).



THE STROOP PARADIGM (1935)

10x10 sheet with 100 stimuli

task

total reading time



Name color

63 sec.

blue red brown purple green

Name word

41 sec.

blue red brown purple green

Name word

43 sec.

blue red brown purple green

Name color of word

110 sec.



SOME HIGHLIGHTS OF AMERICAN READING RESEARCH

John Ridley Stroop (1897-1973).

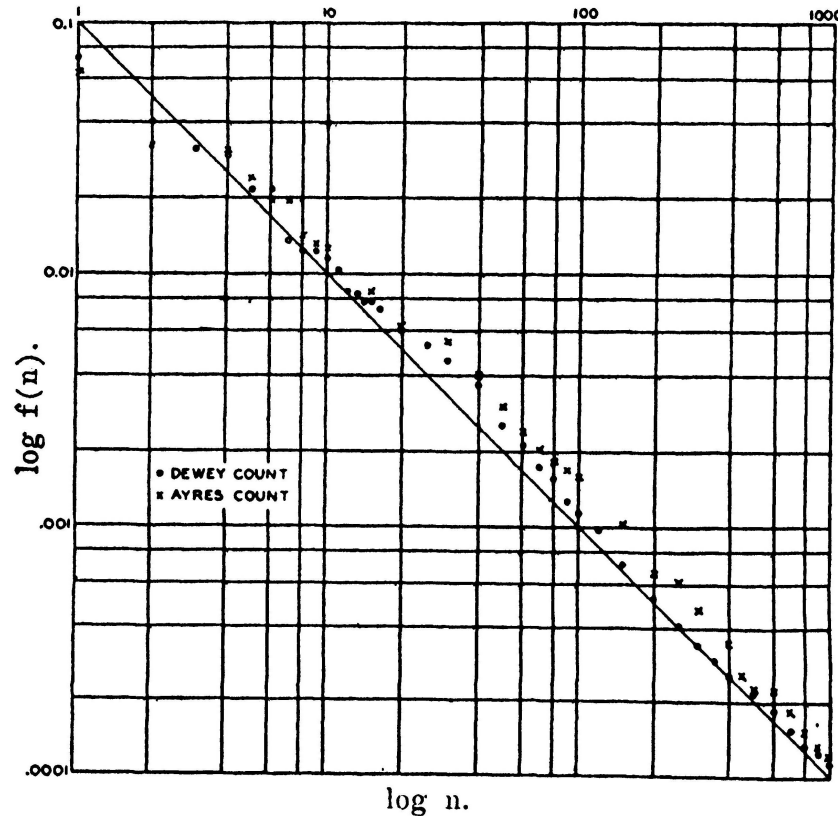


Stroop's self-built house in Nashville



THE STATISTICAL APPROACH

Edward Uhler Condon and the rank/frequency distribution (1928)



$$n \cdot f_n = k$$



where n is a word's rank
and f_n is its frequency in a
word count.

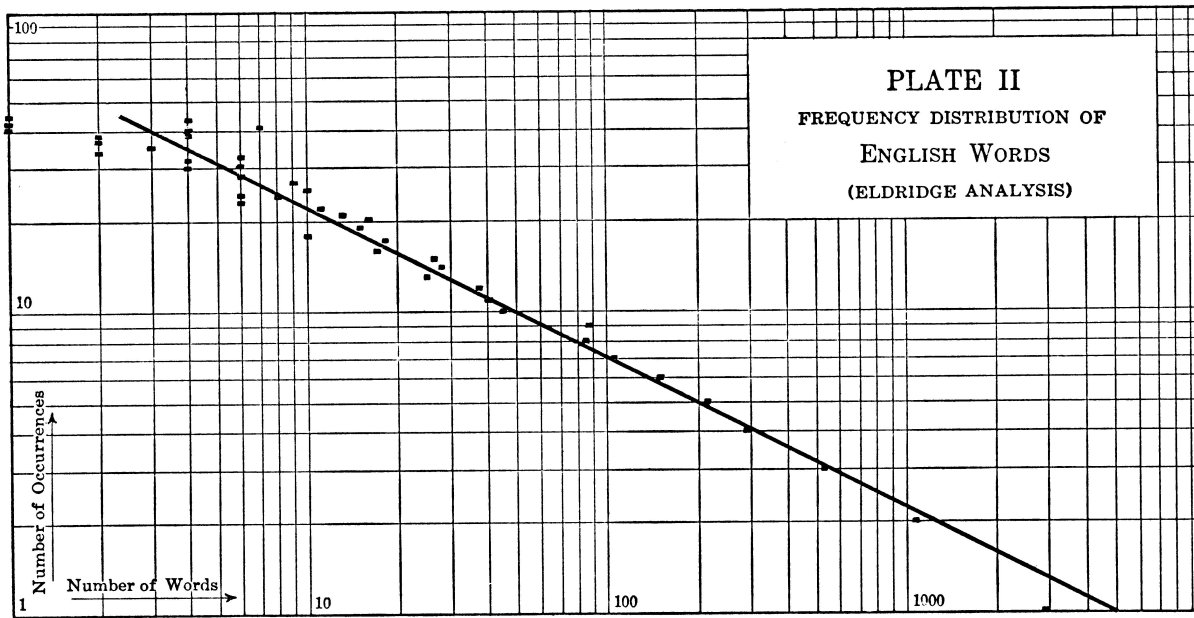
Dewey (1923) counted words
in a 100,000 word text.



THE STATISTICAL APPROACH

George Kinsley Zipf (1902-1950)

*The psycho-biology of language:
An introduction to dynamic philology (1935).*



$$n_f \cdot f^2 = k$$

where n_f is the
number of words
of frequency f .

THE STATISTICAL APPROACH

Zipf's *wave length*. Example text:

*We have defined **the meaning** of a linguistic form as **the** situation in which **the** speaker utters it and **the** response which it calls forth in **the** hearer.*

Here average wave length w_{the} here for **the** is 5.75.

Zipf proposes as a rule of thumb: $w_i = 10r$,
which is independent of text size.

THE STATISTICAL APPROACH

Zipf's (1949) *Principle of least effort*:

For the speaker: *force of unification*. Going for few, high frequency words.

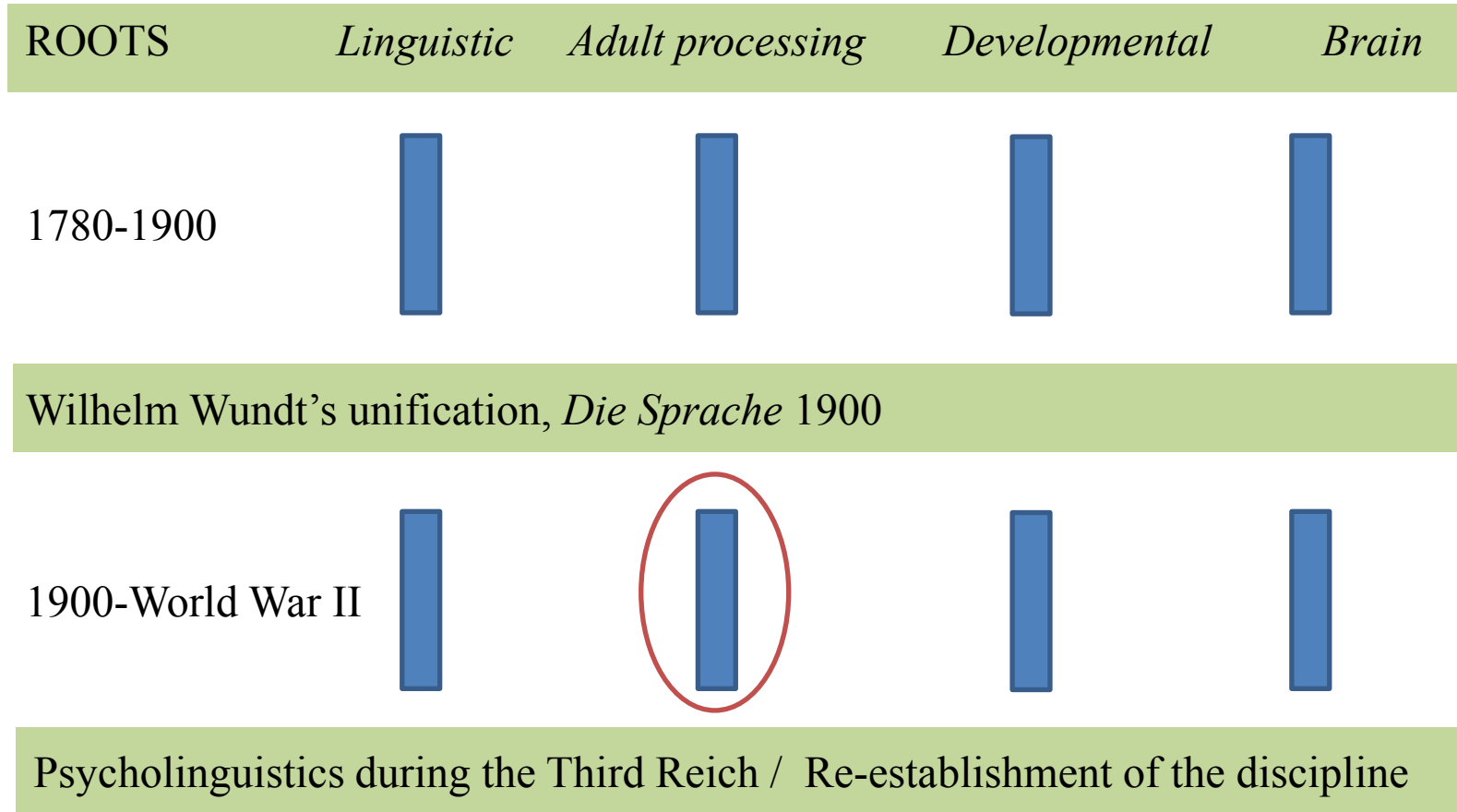
For the hearer: *force of diversification*. Going for many different Low frequency words.

Compromise: the rank/frequency distribution.

BENOIT MANDELBROT, IN GEORGE MILLER'S WORDS

“When we plot our results in the same manner, we will find exactly the same ‘Zipf curves’ for the monkeys as for the human authors. Since we are not likely to argue that the poor monkeys were searching for some equilibrium between uniformity and diversity in expressing their ideas, such explanations seem equally inappropriate for human authors.” Miller (1965)

LECTURE 4 TWENTIETH CENTURY LABORATORY AND STATISTICAL STUDIES OF SPEECH AND LANGUAGE ABILITIES



BEHAVIORIST CONCEPTIONS OF MEANING

...what the animal or human is doing. He means what he does.” . . . His action is the meaning. Hence, exhaust the concept of action and we have exhausted the concept of meaning. Watson (1914).

For the behaviorist the meaning of a stimulus is defined by the responses made to it. Weiss (1925).

*We have defined the **meaning** of a linguistic form as the situation in which the speaker utters it and the response which it calls forth in the hearer. ... It follows from all this that in all study of language, we must start from forms and not from meanings. Bloomfield (1933).*

meaning and meanings do not lend themselves to quantitative measurement, ... Yet, by the isolation of other factors which can be measured, we may gain a considerable insight into the nature of meaning, and perhaps finally apprehend something of its nature and behavior Zipf (1935).

in the last analysis, the correlation of utterances with the social situation in which they occur. Harris (1951).

The central objection to meaning as a criterion of analysis has always been the obscurity of semantic notions. I think it is indeed fair to say that we are currently in pretty much the same state of unclarity with regard to meaning as we are with regard to intuition. And this is a sufficient reason for refusing to admit meaning into linguistic theory.” Chomsky (1955).

SEMANTIC CONDITIONING AND MEDIATION THEORY

JACOB KANTOR: LANGUAGE IS (MERELY) ADJUSTMENT



Jacob Kantor (1888-1984)

THE PSYCHOLINGUISTIC SITUATION ANALYZED

Despite the unfortunate contacts between psychology and linguistics, they must nevertheless coöperate in their language studies. We conclude therefore that what is required is a re-examination of our concepts of both psychology and linguistics.

Traditional linguistics “harks back to the old spiritistic psychology. Language according to this tradition consists of words or acts which materialize spiritistic or mentalistic states. That this worthless and outworn tradition need not stand in the way of a correct understanding of language is indicated by the availability of a completely objective psychology which can entirely supplant the mentalistic tradition. .. We conclude that language as living phenomena cannot be regarded as other than behavior. Language consists of a series of adjustmental interactions and not a set of symbols.”

Psychological grammar then is the study of how language adaptations are actually carried out.

No spirits, wraiths, hobglobins, spooks, noumena, superstitions, transcendentals, mystics, invisible hands, supreme creator, angels, demons,